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The Role of Pain Persistence in the Association Between Negative Urgency and Suicidal Behavior

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THE ROLE OF PAIN PERSISTENCE IN THE ASSOCIATION BETWEEN
NEGATIVE URGENCY AND SUICIDAL BEHAVIOR

by

Hyejin Jin

A Thesis

Submitted to the Graduate School,
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December 2017

THE ROLE OF PAIN PERSISTENCE IN THE ASSOCIATION BETWEEN
NEGATIVE URGENCY AND SUICIDAL BEHAVIOR

by Hyejin Jin

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ABSTRACT

THE ROLE OF PAIN PERSISTENCE IN THE ASSOCIATION BETWEEN NEGATIVE URGENCY AND SUICIDAL BEHAVIOR

by Hyejin Jin

December 2017

Impulsivity has been identified as an important component of suicidal behavior (Mann et al., 1999) but the relationship has been shown to be indirect through painful and provocative events (PPEs; Bender, Gordon, Bresin, Joiner, 2011). Negative urgency (NU) is a subscale of impulsivity (Cyders et al., 2007) that has been associated with high engagement of PPEs such as non-suicidal self-injury because individuals high in NU are highly motivated to eliminate the aversive emotion (Anestis & Joiner, 2011). Past research found that repeated PPEs may increase the capability for suicide by changing how one responds to pain, thereby increasing their pain persistence (Anestis et al., 2014a). Thus, the present thesis project sought to examine the role of pain persistence in the association between NU and suicide attempts

A sample of 120 undergraduate students completed a study protocol consisting of the following: 1) structured interview (Nock et al., 2007), 2) two different pain response tasks, and 3) self-report measures. The results did not support the hypothesis that NU will be associated with suicide attempts and that this relationship will be moderated by pain persistence and indirect through pain persistence. The proposed model did not consider the potential role of dispositional components of pain response in divergent pathways to the capability for suicide. Additionally, the undergraduate sample could have affected the results or limited the extent to which effects were observed. Further research should

examine how other factors, in addition to pain response, can facilitate the transition from suicide ideation to attempt.

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DEDICATION

In addition to those individuals who made my thesis project possible, I would also like to thank my parents for providing me with financial support throughout my education. I also dedicate this work to my brother, Peter, who has always been there for me even when we are miles apart. I am thankful for my dog, Somi, for prompting me to take frequent play breaks with her by placing her Rudolph toy on my lap while I worked on my thesis. Lastly, I am extremely grateful for my partner, Shawn, for being understanding, supportive, and patient with me throughout this process.

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LIST OF ABBREVIATIONS

<i>NSSI</i>	Non-Suicidal Self-Injury
<i>NU</i>	Negative Urgency
<i>PPE</i>	Painful Provocative Events
<i>SITBI</i>	Self-Injurious Thoughts and Behaviors
	Interview
<i>PPE</i>	Painful Provocative Events
<i>UPPS-P</i>	Urgency, Premeditation, Perseverance, Sensation seeking, and Positive Urgency

CHAPTER I - INTRODUCTION

Suicide is the 10th leading cause of death in the United States (CDC, 2015) and also one of the leading causes of death around the world (DeLeo, Bertolote, & Lester, 2002). Despite efficacious evidence-based treatments for suicidality such as dialectical behavior therapy (Linehan, 2015), the national suicide rate has been continuously rising for the past several years (CDC, 2015; WHO, 2014). As such, suicide has been identified as a public health concern and many researchers have tried to gain a better understanding of the risk factors for suicide. These efforts have led to researchers identifying numerous risk factors for suicide such as current suicidal ideation, hopelessness, previous suicide attempts, prior psychiatric disorders, history of physical and sexual assault, increasing age, and social isolation (Joiner & Van Orden, 2008; Nock & Kessler, 2006; Beck, Brown, Steer & Grisham, 2000; Goldstein, Black, Nasrallah, & Winokur, 1991). Among these many variables, impulsivity is one thought to play an important role in suicide.

Impulsivity, the tendency to act without forethought (Whiteside & Lynam, 2001), has been gaining more attention ever since being proposed as an important component of suicidal behavior (Mann et al., 1999). Several models of suicide have posited that suicidal behavior is often an impulsive act that involves little or no deliberation or forethought (Mann et al., 1999; Baumeister, 1990). Furthermore, impulsive traits have been associated with suicidal ideation and behavior (Conner, Meldrum, Wiczorek, Duberstein, & Welte, 2004)

Maser et al., 2002) as well as attempts (Dougherty et al., 2004). However, a recent review paper examined the link between impulsivity and suicidal behavior (Anestis, Soberay, Gutierrez, Hernandez, & Joiner, 2014b) and found that there are many

measurement issues in assessments of impulsivity of suicide attempts, which make the results uninterpretable and contradicts the view that attempts occur without planning. Furthermore, trait impulsivity does not differentiate suicide decedents from living controls (Anestis et al., 2014b). This point is compounded by the fact that, the relationship between impulsivity and suicidal behavior has repeatedly been shown to be indirect through painful and provocative events [PPEs; previous self-injury, physical fights, accidental injuries, etc (Bender, Gordon, Bresin, Joiner, 2011; Joiner, 2005)]. This indicates that it is not the impulsivity itself that drives suicidal behavior but rather that impulsive individuals are more likely to engage in PPEs, which then increases their capability for suicide, defined as an elevated tolerance of physiological pain and a diminished fear of death and bodily harm (Joiner, 2005).

Impulsivity has been defined and conceptualized by many theorists and researchers over the years, but due to a lack of consistency and a tendency not to consider emotion as a vital component of impulsivity, Whiteside & Lynam (2001) created the UPPS Impulsive Behavior Scale. The UPPS-P (Cyders et al., 2007), an expanded version of that same scale, conceptualizes impulsivity as being comprised of five distinct subscales: positive urgency, negative urgency, sensation seeking, (lack of) premeditation, and (lack of) perseverance. The subscale that has been the most thoroughly researched is negative urgency, the tendency to act in a rash, quick manner in order to reduce negative affect. High negative urgency has been shown to be associated with a wide range of problematic outcomes, including engaging in risky and maladaptive behaviors in order to escape negative affect (Cyders & Smith, 2009), dysregulated eating behaviors (Anestis, Smith, Fink, & Joiner, 2009), problematic drinking (Adams, Kaiser, Lynam, Charnigo, &

Milich, 2012), more affective lability and less self-control (Dir, Karyadi, & Cyders, 2013), and risky sexual behavior and illegal substance use (Settles et al., 2012). With respect to suicidality, negative urgency has been shown to be associated with an increased risk of suicidal ideation, behavior, and non-suicidal self-injury (NSSI, the act of enacting self-harm without the intent to die; [Lynam, Miller, Miller, Bornovalova, & Lejuez, 2011]).

Studies have indicated that individuals who are high in negative urgency are at greater risk of resorting to NSSI and thinking about suicide when experiencing negative affective states because they are highly motivated to get rid of the aversive emotion (Anestis & Joiner, 2011). In a sample of both undergraduate students and adults receiving substance use treatment in an inpatient facility, Anestis and colleagues (2014a) reported an indirect effect of negative urgency on suicide attempts through PPEs, namely NSSI. Although this study did not assess the impulsiveness of specific suicide attempts, it is nonetheless consistent with the notion that individuals high in negative urgency do not necessarily make impulsive decisions to make suicide attempts, but are at higher risk of making attempts if they have the suicidal desire, as they are likely to have developed the capability to do so (Bender, Gordon, Bresin, Joiner, 2011). Thus, those who are high in negative urgency may be more likely to progress from thinking about suicide to making an attempt since the capability for suicide is more likely to be present relative to those low in negative urgency. PPEs may affect capability by changing how an individual experiences and responds to pain (i.e., by habituation and increased tolerance for pain), and thus is an important consideration in the association between negative urgency and suicide attempts.

One aspect of pain response that may be worth considering is pain persistence, defined as the difference between pain tolerance (the point at which the pain becomes too intense to continue) and pain threshold (the point when individuals first experience pain). In the literature, however, much of the research has focused on examining pain tolerance and threshold independently in their relationships to different aspects of suicidal behavior. For example, in a sample of undergraduates who had history of NSSI, Franklin, Hessel, and Prinstein (2011) reported that the association between PPEs and fearlessness about death was indirect through pain tolerance. This finding indicates that the manner in which an individual responds to pain may serve as a mechanism that facilitates suicidal behavior, at least among high-risk individuals. That possibility is further supported by research indicating that frequent engagement in NSSI is associated with pain analgesia while engaging in NSSI. Additionally, in a sample of adolescents with a history of NSSI receiving treatment in an inpatient psychiatric unit, pain analgesia during NSSI episodes was associated with a greater likelihood of engaging in more suicide attempts—providing support that pain tolerance is critical in suicidal behavior (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006).

Although pain tolerance is an important variable to understand with respect to suicidal behavior, assessments of pain tolerance and threshold separately from one another may not fully capture the extent to which individuals push through pain once it is experienced. When considering the role of pain in suicidal behavior, it may be important to consider the pain variables together. For instance, an individual with both high pain threshold and tolerance may be different from someone with a low threshold but equally high tolerance. The former (i.e., high threshold and tolerance) experiences pain for a

shorter duration, since the individual would terminate the activity causing the pain soon after it is experienced. On the other hand, individuals who fit into the second group (i.e., low pain threshold and high tolerance) would experience the pain for the longer time and persist through it. Therefore, examining the difference between threshold and tolerance (pain persistence) may provide more information on an individual's willingness to experience pain. Furthermore, there are studies suggesting that pain persistence, the ability to push through pain in the pursuit of death, is a critical component of suicidal behavior (Anestis et al., 2014b). For example, pain persistence has been found to moderate the relationship between current suicidal thoughts and lifetime suicide attempts (Anestis & Capron, 2016).

Although this possibility has not, to our knowledge, been directly examined, prior findings indicate that pain persistence may enhance and/or explain the association between negative urgency and suicide attempts, at least among individuals experiencing suicidal ideation. In an undergraduate sample, negative urgency was inversely associated with fearlessness about death and was not associated with physiological pain tolerance. These findings suggest that, for individuals who have less experience with severe PPEs such as NSSI, negative urgency may render suicide attempts more difficult (Anestis, Bagge, Tull, & Joiner 2011). However, since negative urgency increases the likelihood of suicidal ideation (Anestis & Joiner, 2011) those high in negative urgency may be more motivated to overcome this difficulty and be able to do so if they engage in behaviors that increase their capability, such as NSSI. Engaging in these behaviors, in turn, may increase pain persistence. Thus, pain persistence would facilitate the relationship between negative urgency and suicide attempts among individuals thinking about suicide, as

elevations on this variable would be indicative of a less severe aversion to pain (Anestis, Bagge, Tull, & Joiner 2011).

Pain persistence thus may both enhance and, in some ways, explain the association between negative urgency and suicide attempts among individuals with recent suicidal ideation. This is an important question to pursue because there is a lack of research on the role of pain persistence in the progression of thinking about suicide to making an actual attempt. Thus, it is hypothesized that in a sample of individuals with recent suicidal ideation, negative urgency will be associated with suicide attempts. This relationship is hypothesized to be moderated by pain persistence and, additionally, is expected to be indirect through pain persistence.

CHAPTER II – METHODS

Participants

Participants were 120 undergraduates ($M_{age}=21.15$, 45.8% African American, 75% Female) who were over the age of 18 and recruited from the University of Southern Mississippi online subject pool. Participants who endorsed suicidal ideation in past studies we have conducted and gave permission for us to contact them for future studies were the primary sample. However, recruitment from this method failed to yield sufficient participants and prescreening procedures on the online research participation system were used to recruit more participants. The prescreening process consisted of questions adapted from the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock, Holmberg, Photos, & Michel, 2007) that asked participants a) Have you ever had thoughts of killing yourself? b) How old were you the first time you had thoughts of killing yourself? c) How old were you the last time? d) Have you had thoughts of killing yourself in the past 6 months? The prescreening process significantly limited the number of participants who could sign up for the study. Further, due to restrictions on advertising studies, specifically seeking particular individuals (e.g., those with past suicidal ideation), we removed the ideation requirement and recruited undergraduates more broadly in order to meet our sample size of 120 participants.

Procedures

Structured Interview

The Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock, Holmberg, Photos, & Michel, 2007) was administered by a trained undergraduate research assistant to assess suicide risk level and obtain a comprehensive history of suicide attempts. The

SITBI is originally a 169-item structured interview but the SITBI short-form was used for the purposes of the present study. The SITBI short-form is a 72-item measure that assesses the presence, frequency, and characteristics of five types of suicidal thoughts and behaviors: (a) suicidal ideation (e.g., “Have you ever had thoughts of killing yourself?”), (b) suicide plans (e.g., “Have you ever actually made a plan to kill yourself?”), (c) suicide gestures (e.g., “Have you ever done something to lead someone to believe that you wanted to kill yourself when you had no intention of doing so?”), (d) suicide attempts (e.g., “Have you ever made a suicide attempt to kill yourself in which you had at least some intent to die?”) and (e) non-suicidal self-injury (e.g., “Have you ever had thoughts of purposely hurting yourself without wanting to die?”). If the participant answered “yes” to the first question of each module, the experimenter continued on with the rest of the questions in the module to gain more information on the intensity, frequency and nature of that specific aspect of suicidality. If the participant answered “no,” the experimenter moved onto the next module. The SITBI has strong interrater reliability (average $k = .99$, $r = 1.0$) as well as excellent test-retest reliability (average $k = .70$, intraclass correlation coefficient = .44) over a six-month period (Nock, Holmberg, Photos, & Michel, 2007). Concurrent validity for the SITBI and suicidal ideation, attempt, and NSSI were high as well (.54, .65, .87, respectively; Nock, Holmberg, Photos, & Michel, 2007).

Pain Response Tasks

Two separate pain response tasks were administered. Pressure-based pain was measured using a Wagner FPIX 25 algometer and thermal-based pain was measured using an ANOVA A40 cold pressor. The order in which these two behavioral measures were administered, as well as the hand order for the cold pressor, was counterbalanced to

eliminate order effects. First, the order of the behavioral measures was achieved by using an online random number generator to randomly assign each participant to complete either the pressure algometer or cold pressor task first prior to the experiment. There were an equal number of participants who completed each pain task first before the second pain task (i.e., 60 participants completed the pressure algometer first, the other 60 participants completed the cold pressor first). Secondly, the hand order for the cold pressor task was randomly assigned using the same method to counteract order effects. The order of pain response tasks and hand order of the cold pressor were all randomly assigned before the study began.

Pain tolerance, threshold, and persistence for pressure-based pain was measured using a Wagner FPIX 25 pressure algometer. Pressure was applied below the knuckle of the second finger of the right hand on all participants. The pressure level began at one pound of force and increased by one pound every five seconds. Timing began as soon as pressure was applied on the participants' hand. Participants were instructed to say "pain" to indicate when they first experienced pain (pain threshold), at which point the algometer was released and the level of force was recorded. After a 90-second break, the algometer was applied to the same finger again at one pound of force and the participant was asked to say "stop" to indicate when the pain became too intense to continue (pain tolerance). At that point, the experimenter released pressure and recorded the level of force. Five trials of both threshold and tolerance were administered with 90-second intervals between applications. The total score was based on an average of the five trials. Pain persistence was calculated by subtracting pain threshold (mean across all five trials) from pain tolerance (mean across all five trials), which thereby indexed how much

pressure each individual was willing to tolerate after the point at which they first identified the sensation as pain ($\alpha=.88$). There was a five-minute break between the two behavioral tasks.

Pain tolerance, threshold, and persistence were measured again for thermal-sensation pain using the ANOVA A40 cold pressor. There were two trials, with the hand order counterbalanced, in which the participants were assigned to submerge their left or right hand first. The cooler tank contained water that was set to 2° Celsius (35.6° Fahrenheit) and circulated the water to prevent heat buildup around the immersed hand. The participant was asked to place his/her hand into the cooler tank, up to the wrist, and the timer began as soon as the hand was fully submerged. They were asked to say “pain” to indicate when they first experienced pain (pain threshold) and to remove their hand when the pain became too intense to continue (pain tolerance). There was a 90-second break in between trials. The same process was conducted for the second trial, but with the other hand to counteract any numbness that may impact the follow-up trial. At the end of the two trials, pain persistence was calculated by subtracting pain threshold (mean across two trials) from pain tolerance (mean across two trials), which thereby indexed how much thermal pain each individual was willing to tolerate after the point at which they first identified the sensation as painful.

Self-report questionnaires

The UPPS-P (Cyders et al., 2007) is a 59-item self-report questionnaire using a Likert-scale to measure five subscales of impulsivity: positive urgency (acting rashly when experiencing positive emotions), negative urgency (acting rashly when experiencing negative emotions), sensation-seeking (seeking out activities that involve

risk or thrill), (lack of) premeditation (acting without deliberation), and (lack of) perseverance (giving up easily when activities become difficult or boring). Among the five scales of impulsivity, only negative urgency was included in these analyses. The Negative Urgency subscale consists of twelve items to assess the tendency to act rashly when experiencing negative emotions (e.g., “When I feel bad, I will often do things I later regret in order to make myself feel better now”), all of which will be rated on a scale ranging from 1 (“agree strongly”) to 4 (“disagree strongly”). Out of the 12 items, 11 items were reversed scored and the total sum score for these items was the negative urgency score for each participant, with higher scores indicating a higher tendency to make rash decisions when experiencing negative emotions ($\alpha=.82$). The UPPS-P is a measure with high internal consistency among the subscales, good convergent and divergent relations among the items, and high test-retest reliability (.84 to .92; Cyders et al., 2007).

Risk management protocol

After completing the protocol, all participants, regardless of the severity of their suicide risk, were given a handout with emergency numbers and resources (i.e, National Suicide Prevention Hotline, 911, USM Psychology Clinic, Student Health Services). For those individuals who endorsed a current suicide plan within the past week (as indicated by the SITBI), the principal investigator was on-call to conduct a thorough suicide assessment (Chu et al., 2015) to determine the appropriate actions based on the level of risk to ensure the safety of the individual. If neither the principal investigator nor lab director were available, an undergraduate or post-baccalaureate research assistant who was running the protocol was trained take the participant to the USM Psychology Clinic

so that another Clinical Psychology doctoral student could conduct the suicide risk assessment. This suicide risk management protocol was not needed during the present study, as none of the participants endorsed having a suicide plan within the past week.

Data Analytic Plan

Before the data was analyzed, data screening procedures were conducted to account for missing and invalid values. To test the proposed moderation model, we utilized hierarchical linear regression using the PROCESS macro for SPSS. Negative urgency was the predictor variable, pain persistence was the moderator, and suicide attempts served as the outcome variable. None of the demographic variables were significantly correlated with either the predictor or outcome variable; thus, the models were run without covariates. Simple slopes were used to examine the nature of significant interaction terms.

A test of indirect effects was then used to examine whether there is a significant indirect effect of negative urgency on suicide attempts through pain persistence. Significant effects were assessed via bias-corrected 95% confidence intervals and 5,000 bootstrapped resamples, signified by the absence of 0 within the confidence interval.

There were two sets of analyses, both for the moderation analyses and tests of indirect effects: one using pressure-based pain (i.e., pressure algometer), and another for thermal-based pain (i.e., cold pressor). For the moderation analyses, f^2 was utilized as an index of effect size. For the tests of indirect effects, kappa squared and the ratio of the indirect effect to the total effect was utilized as effect size indices.

CHAPTER III - RESULTS

All 120 participants were included in data analytic procedures. Suicide ideation was non-normally distributed, with skewness of -10.91 and kurtosis of 119.36. The number of suicide attempts variable was non-normally distributed as well, with skewness of -10.932 and kurtosis of 119.67. Thus, a rank transformation with Blom's Formula was used to better approximate normality prior to data analyses. The majority of the sample had never thought of suicide, with 82 of the participants (68.3%) reporting no previous history of suicidal ideation. Thirty-seven of the participants (30.8%) reported a history of suicidal ideation, with 14 participants endorsing past suicide attempts (37.8%) and 23 (62.2%) denying any history of suicide attempts. Given the low rate of suicidal ideation within the sample, analyses were run utilizing the full sample rather than only among those with suicidal ideation. Participants' pain persistence scores for left and right hands on the cold pressor task were compared using a paired samples *t*-test. Results suggested that participants had higher pain persistence on the right hand for the cold pressor task ($M=11.71$, $SD=23.30$) than the left hand ($M=10.13$, $SD=19.70$), $t(119)=-2.97$, $p=.004$.

Hierarchical linear regression results suggested that negative urgency was not significantly associated with higher numbers of lifetime suicide attempts, and thermal-based pain persistence did not moderate this relationship, $F(3, 102)= 2.38$, $p=.07$, $R^2=.07$ (Table 1). Pressure-based pain persistence also did not moderate the relationship between negative urgency and lifetime suicide attempts, $F(3, 102)= .68$, $p=.57$, $R^2=.02$ (Table 2). Results indicated that there was not a significant indirect effect of negative urgency on suicide attempts through thermal-based pain persistence, $F(1, 104)= .15$, $p=.70$, $R^2=.04$

(Table 3) or through pressure-based pain persistence, $F(1, 104) = .15, p = .70, R^2 = .00$
 (Table 3).

Table 1

Results from hierarchical linear regression examining the moderating role of thermal-based pain persistence in the relationship between negative urgency and number of lifetime suicide attempt

	R^2	ΔR^2	b	SE	t	p
Thermal-based pain persistence			0.003	0.005	0.665	0.508
Negative urgency			0.005	0.008	0.543	0.584
Pain persistence X negative urgency	0.065	0.005	0.000	0.001	-0.744	0.459

Table 2

Results from hierarchical linear regression examining the moderating role of pressure-based pain persistence in the relationship between negative urgency and number of lifetime suicide attempt

	R^2	ΔR^2	b	SE	t	p
Pressure-based pain persistence			0.035	0.059	0.586	0.559
Negative urgency			0.003	0.008	0.403	0.688
Pain persistence X negative urgency	0.020	0.016	-0.003	0.002	-1.232	0.203

Table 3

Indirect effect of negative urgency on lifetime suicide attempts through pain persistence

	Lifetime suicide attempt		
	<i>b</i>	<i>SE</i>	95% CI
Indirect effect through thermal-based pain persistence	-0.001	0.003	-0.007 – 0.008
Indirect effect through pressure-based pain persistence	0.000	0.001	-0.001 – 0.003

Given the low number of suicide attempt survivors in the sample and the limited range with respect to lifetime number of suicide attempts, we recoded lifetime number of suicide attempts into a new variable of zero or one or more attempts, and binomial logistic regression analyses were conducted for both thermal and pressure-based pain persistence. Thermal-based pain persistence did not significantly moderate the relationship between negative urgency and lifetime suicide attempts, $B=-.00$ ($SE = .01$), $p=.70$. There was no indirect effect of negative urgency on suicide attempts through thermal –based pain persistence, $F(1, 104)= .21$, $p=.65$, $R^2=.00$. Lastly, pressure-based pain persistence did not significantly moderate the relationship between negative urgency and lifetime suicide attempts, $B=-.00$ ($SE B= .01$), $p=.99$. There was no indirect effect of negative urgency on suicide attempts through pressure-based pain persistence, $F(1, 104)= .02$, $p=.86$, $R^2=.00$.

Lastly, correlations between the four variables in the model for the full sample as well as the subsample of individuals with a history of suicidal ideation are reported below in Table 4. In the full sample, pressure-based and thermal-based pain persistence were significantly correlated, $r =.321$, $p<.001$, as were suicide attempts and thermal-based pain

persistence, $r = .227$, $p = .05$. In the subsample of those with a history of suicidal ideation, thermal-based and pressure-based pain persistence was significant correlated $r = .399$, $p = .05$.

Table 4

Correlation and descriptive table for full sample vs. suicide ideation sample

Variables	1	2	3	4
1. Negative Urgency	-	-.229	-.021	.047
2. Thermal Pain Persistence	-.045	-	.399*	.234
3. Pressure pain Persistence	-.018	.321**	-	-.224
4. Suicide attempts	.038	.227*	-.079	-

Descriptives for full sample

Mean	25.74	10.92	3.58	.04
SD	7.10	21.38	3.37	.60
Minimum	12	0	1.89	-2.56
Maximum	43	231.58	15.83	1.53

Descriptives for subsample with suicidal ideation

Mean	28.52	16.77	4.16	.49
SD	6.61	37.11	3.64	.82
Minimum	17	1.89	1.89	-.15
Maximum	43	231.58	13	1.53

Note: Correlations for the full sample are below the diagonal and those for the subsample with suicide ideation are represented above the diagonal. ** Represents correlations that are significant at the 0.01 level (2-tailed) and * Represents correlations that are significant at the 0.05 level (2-tailed).

CHAPTER IV – DISCUSSION

This study sought to examine whether pain persistence would both enhance and, in some ways, explain the association between negative urgency and suicide attempts among individuals with recent suicidal ideation. It was hypothesized that negative urgency would be associated with suicide attempts and that this relationship would be moderated by pain persistence and indirect through pain persistence. Contrary to our expectations, however, there were no significant associations between negative urgency and suicide attempts, and pain persistence did not moderate or mediate this relationship. Given that the hypotheses were not supported by the results, the model posited by this study may have been incorrect. The model assumed that pain persistence is acquired by individuals who have the tendency to act in a rash, quick manner in order to reduce negative affect (i.e., high in negative urgency), which would then facilitate the transition to making a suicide attempt if they have thoughts of suicide. However, it is possible that pain persistence is also a dispositional variable rather than an acquired one.

Klonsky & May (2015) posit that there are three components of the capability for suicide: dispositional, acquired, and practical. Dispositional variables are those that are characterized by genetic factors, such as pain sensitivity. In fact, pain sensitivity appears to be determined by a number of genes, suggesting that there is a genetic component to the inter-individual variability in pain responses (Young, Lariviere, & Belfer, 2012; Lacroix-Fralish & Mogil, 2009). Pain phenotypes have been evaluated with single nucleotide polymorphisms (SNPs) in the human genome, and it has shown that single SNPs or a combination of SNPs contribute to pain susceptibility (Foulkes & Wood, 2008). Further, various genes (e.g., SCN9A, KCNS1, CACNA2D3, CACNG2) appear to

affect ion channels in the human body, which then increases chronic pain and sensitivity to pain (Young, Lariviere, & Belfer, 2012). Thus, one's sensitivity to pain appears to be partially determined by genetics. If variations within the aforementioned genes are observed in an individual, it is likely that they would have lower sensitivity to pain. In fact, mutations in these genes are responsible for pain disorders such as primary erythralgia and paroxysmal extreme pain disorder (Reimann et al., 2010). Thus, the individuals who are both high in negative urgency and are predisposed to not experience pain as quickly or intensely (i.e., low pain sensitivity) would be more likely to engage in PPEs in order to reduce negative affect. On the other hand, the individuals with high negative urgency and high pain sensitivity would be less likely to consider or engage in PPEs such as NSSI when experiencing negative affect because the pain would be too aversive. Even though the two groups are both high in negative urgency, the innate predisposition to pain sensitivity would differentiate their path towards capability by impacting their behavioral decisions when experiencing aversive emotional and/or physical states.

Differential pain sensitivity could affect the divergent pathways to capability for suicide by influencing the ways in which individuals respond to pain in general. Those with high negative urgency and low pain sensitivity would have more experience with PPEs, increasing their pain threshold and tolerance (i.e., detecting pain at higher thresholds and tolerating pain at higher levels) over time. If these individuals had suicidal desire, their repeated exposure to PPEs in combination with their dispositional low pain sensitivity could make it easier for them to persist through the physiological pain that is necessary to enact lethal self-harm in pursuit of death since they have now both

dispositional and acquired capability for suicide. On the other hand, those with high pain sensitivity would be less likely to seek out engaging in PPEs when experiencing negative affect since it would be too physiologically painful for them. Without experience with PPEs, their capability to enact lethal self-harm when emotionally distressed would be low, rendering death by suicide a less likely choice. Thus, capability, potentially manifested as pain persistence, increases the likelihood that an individual would act on suicidal thoughts. In addition, dispositional factors such as low pain sensitivity could increase the likelihood of the transition to attempts even further (O'Connor, 2011). Therefore, it is likely that the transition from ideation to attempt among individuals with dispositional factors (e.g., low pain sensitivity) could be facilitated by pain persistence, which could be acquired through repeated PPEs. Thus, perhaps dispositional capability could have played a role in the proposed model because the undergraduate students in our sample may have had high pain sensitivity, making it more difficult for them to acquire capability such as pain persistence. Indeed, PPEs seem to mediate the relationship between negative urgency and capability and suicide attempts (Anestis, Soberay, Gutierrez, Hernanadez, & Joiner, 2014). Therefore, individuals with high pain sensitivity might not have had the experiences that would be necessary to overcome the innate fear of pain involved in a suicide attempt due to low pain persistence.

In addition to dispositional variables that might have played a role in the proposed model, the methodology of this study may have interfered with our ability to test the hypotheses. The order in which the two pain response tasks (i.e., pressure algometer vs. cold pressor) were administered, as well as the hand order for the cold pressor task was counterbalanced, for any order effects. However, not all study elements were

counterbalanced, as all participants were administered the SITBI structured interview first, the pain response tasks second, and the self-report measures last. There is a possibility that asking participants questions about suicidal behaviors from the SITBI impacted their pain responses, or it also could have induced arousal or rumination that could have interacted with their responses.

Overall, this study used an undergraduate sample with only a small subset that endorsed history of ideation. When the ideation requirement was removed and undergraduates were recruited more broadly to facilitate the recruitment of an adequate sample size, ideation and behavior became even less commonly endorsed. Indeed, only 30.8% of the sample endorsed a history of ideation and 11.67% of the sample reported having made a suicide attempt. Thus, low base rates of suicide ideation and attempts in an undergraduate sample may have affected our ability to detect differences in negative urgency or pain persistence. However, negative urgency and thermal-based pain persistence were negatively correlated in the subsample of participants with history of suicidal ideation, although not significant $r = -.227, p = .20$. This suggests that those who have previously thought about suicide were not able to persist through pain in the cold pressor task if they were high in negative urgency, which is the opposite of what is hypothesized in the present study. This may be because the subsample of undergraduates with a history of ideation may not have had enough PPEs to increase their pain persistence. Indeed, among individuals who have less experience with severe PPEs such as NSSI, negative urgency may actually render suicide attempts more difficult (Anestis, Bagge, Tull, & Joiner 2011) because they were not able to overcome their aversion to pain. In fact, a general ability to tolerate discomfort was shown to play a stronger role in

heightened pain tolerance than high negative urgency in a sample of undergraduates (Anestis, Bagge, Tull, & Joiner 2011). Thus, it may be possible that negative urgency would be associated with suicidal behavior only when high distress tolerance is present and increases the individual's pain tolerance to enact self-harm.

The present study design uniquely implemented two different pain tolerance tasks to each participant: a cold pressor task measuring thermal-based pain, and the pressure algometer task measuring pressure-based pain. Pain persistence from both tasks was positively correlated to each other, suggesting that both tasks measured persistence in the same manner (i.e., an individual with high pain persistence would obtain high scores on both the cold-pressor and algometer task). This result is consistent with that from another study that implemented both the cold-pressor and algometer task (Miller, Rausher, Hyatt, Maples, & Zeichner, 2014). Our data also suggested that the number of lifetime suicide attempts were positively correlated with thermal-based pain persistence, suggesting that pain persistence increased as individuals reported a higher number of total suicide attempts. This result is consistent with extant literature on how pain persistence is related to capability and suicide attempts. However, this correlation was not observed between lifetime suicide attempts and pressure-based persistence. These results, although correlational, could suggest that even if both the cold pressor and pressure algometer are valid tasks by which pain responses can be experimentally measured, thermal-based pain might be more closely related to that required in self-harm and suicide attempts. Thus, using the cold pressor task in suicide research might be a better approach when assessing pain responses.

The model in the present study hypothesized that negative urgency would be associated with suicide attempts. Contrary to our expectations, however, there were no significant associations between negative urgency and suicide attempts. Our results are inconsistent with results from the literature, which suggests that negative urgency is associated with capability for suicide and lifetime suicide attempt (Anestis & Joiner, 2011) and that this relationship would be explained by PPEs (Anestis et al., 2011). In the present model, we posited that negative urgency would be associated with suicide attempts because it was assumed that high negative urgency would increase the capability for suicide attempts, which would result in a higher number of lifetime suicide attempts. Given the discrepancies of the relationship between negative urgency and suicide attempts, this difference may be due to the different samples that were used in each study. Both Anestis & Joiner (2011) and Anestis and colleagues (2011) used participants from an outpatient community mental health clinic, which would have higher base rates of psychopathology than the general undergraduate sample that was used in the present study. The relationship between negative urgency and suicide attempts might not have been observed in our general undergraduate sample because they are less likely to engage in PPEs to overcome their fear of death and habituate them to pain. Thus, undergraduate students high in negative urgency may be engaging in other behaviors to reduce negative affect other than engaging in PPEs, such as problematic alcohol consumption and problematic eating (Dir, Karyadi & Cyders, 2013), which do not affect capability for suicide.

Overall, the study sought to examine the association between negative urgency and suicide attempts and whether this relationship would be indirectly affected or

moderated by pain persistence. The results did not support the hypotheses, suggesting either that the proposed model was incorrect or that the results were affected by assessment method and the sample that were used. The proposed model did not consider the potential role of dispositional factors of capability (i.e., pain sensitivity) in divergent pathways to capability for suicide and how such factors influence the ways in which individuals respond to pain in general. In addition, pain response is not the only feasible amplifier of the relationship between negative urgency and suicidal behavior. Indeed, high distress tolerance (i.e., being capable of tolerating aversive affective and physiological arousal) is important to consider (Anestis, Knorr, Tull, Lavender, & Gratz, 2013) and perhaps high psychological distress tolerance coupled with high pain persistence could have both been considered in the model. Secondly, not all study elements were counterbalanced, with all participants beginning the study with the SITBI. Asking participants questions about suicidal behaviors from the SITBI may have impacted their pain responses. Further, our results showed that suicide attempts were significantly and positively correlated with thermal-based pain persistence but not with pressure-based pain. This suggests that thermal-based pain, as measured through the cold pressor task, might be a better proxy of pain that is associated with self-harm. Although the order in which the cold pressor and pressure algometer task was counterbalanced, administering both tasks to all participants may have been unnecessary. Lastly, using undergraduate students as our primary sample could have limited the extent to which effects were observed. Although the hypotheses were not supported by the data, further research should examine how other factors, in addition to pain response, can facilitate the transition from suicide ideation to attempt.

APPENDIX A – IRB Approval Letter



INSTITUTIONAL REVIEW BOARD

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NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 16092808

PROJECT TITLE: Impulsivity and Pain

PROJECT TYPE: New Project

RESEARCHER(S): Hyejin Maria Jin

COLLEGE/DIVISION: College of Education and Psychology

DEPARTMENT: Psychology

FUNDING AGENCY/SPONSOR: N/A

IRB COMMITTEE ACTION: Expedited Review Approval

PERIOD OF APPROVAL: 10/18/2016 to 10/17/2017

Lawrence A. Hosman, Ph.D.

Institutional Review Board

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